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Sensitising capacity of five different wheat products through the skin

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Background: Allergic sensitisation to foods may occur in infancy without prior oral exposure to the offending food. This has led to the assumption that food allergy sensitisation may occur through alternative routes, such as the skin. Recently, concerns have been raised regarding the safety of use of cosmetics and personal care products containing hydrolysed wheat proteins, since these products have been shown to induce allergy towards acid hydrolysed wheat through the skin.

Methods: The aim of the study was to compare the sensitising capacity of five different wheat products; an unmodified gluten product, an enzyme hydrolysed gluten product, and three acid hydrolysed gluten products. Their sensitising capacity and the dose response-relationship was evaluated in a Brown Norway rat skin sensitisation model. Rats were bred and raised on a gluten free diet. Products were applied on slightly damaged skin for one hour per day for three consecutive days. This was repeated for five weeks and rats were subsequently given two oral post-immunisations.

Results: All five gluten products were able to induce a specific antibody response and sensitise through the skin after application on the slightly damaged skin without any use of adjuvant. All products showed a clear dose response-relationship where the highest dose gave the highest response. On the basis of inhibitory ELISA cross-reactivity between the products were examined and differences could be observed between the products. Acid hydrolysed gluten behaved differently than the enzyme hydrolysed gluten indicating that new epitopes had been developed. Furthermore, it seemed that the amount of new epitopes that had been developed was dependent on the degree of acid hydrolysis.

Conclusion: This study showed that all five gluten products were able to sensitise through slightly damaged skin. The response was dependent on the dose applied on the skin together with the degree of modification of the different wheat products.